

# Supplemental Information

## TABLE OF ICD-9 CODES USED TO DEFINE COMORBIDITIES

Supplemental Table 4 lists the ICD-9 codes used to define various comorbidities throughout this article. The ICD-9 codes used to define each comorbidity are based on groupings used in PheWAS studies.

**SUPPLEMENTAL TABLE 4** ICD-9 Codes Used to Determine the Presence of Seizures and Psychiatric Disorders

Comorbidity	PheWAS Categories	Associated ICD-9 Codes
Pervasive developmental disorders	Pervasive developmental disorders	299, 299.0, 299.00, 299.01, 299.1, 299.10, 299.11, 299.8, 299.80, 299.81, 299.9, 299.90, 299.91
Specific delays in development	Specific delays in development	315, 315.0, 315.00, 315.01, 315.02, 315.09, 315.1, 315.2, 315.3, 315.31, 315.32, 315.34, 315.39, 315.4, 315.5, 315.8, 315.9
Seizure	Epilepsy and recurrent seizures	345, 345.0, 345.00, 345.01, 345.1, 345.10, 345.11, 345.2, 345.3, 345.4, 345.40, 345.41, 345.5, 345.50, 345.51, 345.6, 345.60, 345.61, 345.7, 345.70, 345.71, 345.8, 345.80, 345.81, 345.9, 345.90, 345.91, 649.4, 649.40, 649.41, 649.42, 649.43, 649.44
Psychiatric disorders	Transient mental disorders, schizophrenic disorders, major depression, bipolar disorder, paranoid states, other nonorganic psychoses	296.0, 296.00, 296.01, 296.02, 296.03, 296.04, 296.05, 296.06, 296.1, 296.10, 296.11, 296.12, 296.13, 296.14, 296.15, 296.16, 296.4, 296.40, 296.41, 296.42, 296.43, 296.44, 296.45, 296.46, 296.5, 296.50, 296.51, 296.52, 296.53, 296.54, 296.55, 296.56, 296.6, 296.60, 296.61, 296.62, 296.63, 296.64, 296.65, 296.66, 296.7, 296.8, 296.80, 296.81, 296.89, 295, 295.0, 295.00, 295.01, 295.02, 295.03, 295.04, 295.05, 295.1, 295.10, 295.11, 295.12, 295.13, 295.14, 295.15, 295.2, 295.20, 295.21, 295.22, 295.23, 295.24, 295.25, 295.3, 295.30, 295.31, 295.32, 295.33, 295.34, 295.35, 295.4, 295.40, 295.41, 295.42, 295.43, 295.44, 295.45, 295.5, 295.50, 295.51, 295.52, 295.53, 295.54, 295.55, 295.6, 295.60, 295.61, 295.62, 295.63, 295.64, 295.65, 295.7, 295.70, 295.71, 295.72, 295.73, 295.74, 295.75, 295.8, 295.80, 295.81, 295.82, 295.83, 295.84, 295.85, 295.9, 295.90, 295.91, 295.92, 295.93, 295.94, 295.95, 296.2, 296.20, 296.21, 296.22, 296.23, 296.24, 296.25, 296.26, 296.3, 296.30, 296.31, 296.32, 296.33, 296.34, 296.35, 296.36, 296.82, 311
Gastrointestinal disorders	Regional enteritis, ulcerative colitis, noninfectious gastroenteritis and colitis	556, 556.0, 556.1, 556.2, 556.3, 556.4, 556.5, 556.6, 556.8, 556.9, 555, 555.0, 555.1, 555.2, 555.9, 558, 558.1, 558.2, 558.3, 558.4, 558.41, 558.42, 558.9
Auditory disorders	Disorders of the external ear, otitis media and Eustachian tube disorders, hearing loss	380, 380.0, 380.00, 380.01, 380.02, 380.03, 380.1, 380.10, 380.11, 380.12, 380.13, 380.14, 380.15, 380.16, 380.2, 380.21, 380.22, 380.23, 380.3, 380.30, 380.31, 380.32, 380.39, 380.4, 380.5, 380.50, 380.51, 380.52, 380.53, 380.8, 380.81, 380.89, 380.9, 381, 381.0, 381.00, 381.01, 381.02, 381.03, 381.04, 381.05, 381.06, 381.1, 381.10, 381.19, 381.2, 381.20, 381.29, 381.3, 381.4, 381.5, 381.50, 381.51, 381.52, 381.6, 381.60, 381.61, 381.62, 381.63, 381.7, 381.8, 381.81, 381.89, 381.9, 382, 382.0, 382.00, 382.01, 382.02, 382.1, 382.2, 382.3, 382.4, 382.9, 389, 389.0, 389.00, 389.01, 389.02, 389.03, 389.04, 389.05, 389.06, 389.08, 389.1, 389.10, 389.11, 389.12, 389.13, 389.14, 389.15, 389.16, 389.17, 389.18, 389.2, 389.20, 389.21, 389.22, 389.7, 389.8, 389.9
Cardiac disorders	Cardiac dysrhythmia, heart failure, bulbus cordis anomalies	427, 427.4, 427.41, 427.42, 427.5, 427.6, 427.60, 427.61, 427.69, 427.8, 427.81, 427.89, 427.9, 428, 428.0, 428.1, 428.2, 428.20, 428.21, 428.22, 428.23, 428.3, 428.30, 428.31, 428.32, 428.33, 428.4, 428.40, 428.41, 428.42, 428.43, 428.9, 745, 745.0, 745.1, 745.10, 745.11, 745.12, 745.19, 745.2, 745.3, 745.4, 745.5, 745.6, 745.60, 745.61, 745.69, 745.7, 745.8, 745.9

## COMPARISON OF THE TWO HOSPITAL SAMPLES

There were 496 individuals (80% male patients) of at least 15 years of age with a primary diagnosis of ASD from Wake Forest University Health Services and 4950 individuals (78% male) of at least 15 years of age from Boston Children's Hospital. We only considered diagnostic codes in the first 15 years of life so the ages of the samples were perfectly matched. Individuals from Wake Forest averaged a total of 12.0 codes for ASD (95% confidence interval [CI] 10.5–13.4) over these 15 years, whereas individuals from Boston Children's Hospital averaged 5.28 (95% CI 4.93–5.63). Implications about disease severity, however, cannot be made on the basis of these data because Wake Forest sees many individuals as their primary care providers, whereas individuals come to Boston Children's Hospital largely to see specialists. Supplemental Table 5 compares the proportions of various comorbidities in the 2 samples.

**SUPPLEMENTAL TABLE 5** Rates (With 95% CIs) of Various Comorbidities in the Wake Forest and Boston Children's Hospital Samples

Condition	Wake Forest Rate	Boston Children's Rate
Mental retardation	28.3 (24.2–32.3)	16.2 (15.1–17.2)
Seizure	21.7 (18.0–25.5)	21.5 (20.4–22.7)
Psychiatric disorders	4.9 (2.9–6.8)	7.5 (6.7–8.2)
Gastrointestinal disorders	5.7 (3.6–7.8)	5.1 (4.5–5.7)
Muscular dystrophy	0.6 (0.0–1.3)	1.4 (1.1–1.7)
Sleep disorders	9.1 (6.5–11.7)	9.7 (8.9–10.6)
Auditory disorders and infections	31.5 (27.3–35.7)	28.2 (26.9–29.5)
Cardiac disorders	5.5 (3.4–7.5)	9.6 (8.8–10.4)

Our analyses specifically focused on psychiatric, gastrointestinal, and seizure disorders. The 3-way Supplemental Tables 6 and 7 contain the counts for how many individuals had each combination of these disorders in the Wake Forest and Children's Hospital Boston samples, respectively. There was no statistical evidence for a difference between these 2 sets of counts ( $P = .22$ ).

**SUPPLEMENTAL TABLE 6** Joint Counts of Seizures, Psychiatric Disorders, and Gastrointestinal Disorders in the Wake Forest Sample

	Gastrointestinal Disorders		No Gastrointestinal Disorders	
	Seizures	No Seizures	Seizures	No Seizures
Psychiatric disorders	1	1	1	22
No psychiatric disorders	13	13	94	351

**SUPPLEMENTAL TABLE 7** Joint Counts of Seizures, Psychiatric Disorders, and Gastrointestinal Disorders in the Children's Hospital Boston Sample

	Gastrointestinal Disorders		No Gastrointestinal Disorders	
	Seizures	No Seizures	Seizures	No Seizures
Psychiatric disorders	10	18	81	262
No psychiatric disorders	87	138	891	3463

## FULL P VALUE TABLES FOR CLUSTERING ANALYSIS

The tables below list the *P* values corresponding to the relevance of each PheWAS category to each subgroup. The numbers in bold are statistically significant after correction for multiple hypothesis testing.

To summarize the temporal patterns associated with these *P* values, we have indicated whether the prevalence of that PheWAS category was larger or smaller than the overall sample in each time period from 0 to 5 years, 6 to 10 years, and 11 to 15 years with a pattern of plus symbols and minus symbols. For example, a pattern  $-/+/+$  would indicate that the category was initially less prevalent than the overall sample from ages 0 to 5 years and then more prevalent from age 5 to 15 years. These patterns are provided as a descriptive summary only; the *P* values were computed by using permutation tests from all 30 6-month time windows described in the Methods section.

Full *P* Value Table Comparing Cases in Each Cluster to the Overall Sample

PheWAS	Subgroup 1	Subgroup 2	Subgroup 3	Subgroup 4
Conduct disorders	<.001, -/+/+	<.001, -/+/+	<.001, -/+/+	<.001, -/-/-
Specific delays in development	<.001, +/+/+	<.001, +/+/+	<.001, -/+/+	<.001, -/-/-
Mental retardation	<.001, -/+/+	<.001, +/+/+	<.001, -/+/+	<.001, -/-/-
General symptoms	<.001, +/+/+	<.001, +/+/+	<.001, +/+/+	<.001, -/-/-
Symptoms involving head and neck	<.001, -/+/+	<.001, +/+/+	<.001, -/+/+	<.001, -/-/-
Streptococcal sore throat and scarlet fever	.07	<.001, -/-/-	<.001, -/-/-	<.001, -/-/-
Bacterial infection in conditions classified elsewhere and of unspecified site	<.001, -/-/-	<.001, +/-/-	.17	<.001, -/-/-
Viral and chlamydial infection in conditions classified elsewhere and of unspecified site	.06	<.001, +/+/+	<.001, -/+/-	<.001, -/-/-
Other and unspecified protein-calorie malnutrition	<.001, -/+/+	<.001, +/-/-	.37	<.001, -/-/-
Disorders of fluid, electrolyte, and acid-base balance	<.001, +/+/+	<.001, +/+/+	.06	<.001, -/-/-
Disorders involving the immune mechanism	<.001, -/+/+	<.001, +/+/+	.05	<.001, -/-/-
Transient mental disorders due to conditions classified elsewhere	<.001, -/+/-	<.001, -/-/-	.18	<.001, -/-/-
Pervasive developmental disorders	<.001, -/-/+	.02	<.001, -/+/+	<.001, -/-/-

Full *P* Value Table Comparing Cases in Each Cluster to the Autistic Population, Continued

PheWAS	Subgroup 1	Subgroup 2	Subgroup 3	Subgroup 4
Special symptoms or syndromes, not elsewhere classified	.00	<.001, -/-/+	<.001, -/+/+	<.001, -/-/-
Adjustment reaction	.03	<.001, -/+/-	<.001, -/+/+	<.001, -/-/-
Hyperkinetic syndrome of childhood	.00	<.001, -/+/+	<.001, -/+/+	<.001, -/-/-
Other cerebral degenerations	<.001, +/+/+	<.001, +/-/-	.13	<.001, -/-/-
Infantile cerebral palsy	<.001, +/+/+	<.001, +/+/+	.31	<.001, -/-/-
Other paralytic syndromes	<.001, -/-/+	<.001, -/-/-	.74	<.001, -/-/-
Epilepsy and recurrent seizures	<.001, +/+/+	<.001, +/+/+	.01	<.001, -/-/-
Other conditions of brain	<.001, -/+/+	<.001, +/-/+	.09	<.001, -/-/-
Other and unspecified disorders of the nervous system	<.001, +/-/-	<.001, +/-/-	.02	<.001, -/-/-
Disorders of refraction and accommodation	<.001, -/+/+	<.001, +/+/+	.00	<.001, -/-/-
Visual disturbances	<.001, -/+/+	<.001, -/+/+	.23	<.001, -/-/-
Blindness and low vision	<.001, -/+/+	<.001, -/-/+	.67	<.001, -/-/-
Strabismus and other disorders of binocular eye movements	<.001, +/+/+	<.001, +/+/+	.06	<.001, -/-/-
Hearing loss	<.001, +/+/+	<.001, +/+/+	.04	<.001, -/-/-
Cardiac dysrhythmias	.00	<.001, -/-/+	<.001, -/+/+	<.001, -/-/-
Late effects of cerebrovascular disease	<.001, -/-/-	<.001, -/-/-	.82	<.001, -/-/-
Hypotension	<.001, -/-/-	<.001, -/-/-	.71	<.001, -/-/-
Acute upper respiratory infections of multiple or unspecified sites	.02	<.001, +/+/+	<.001, +/+/+	<.001, -/-/-

Full P Value Table Comparing Cases in Each Cluster to the Autistic Population, Continued

PheWAS	Subgroup 1	Subgroup 2	Subgroup 3	Subgroup 4
Chronic sinusitis	<.001, -/-/+	<.001, -/-/-	.01	<.001, -/-/-
Other diseases of upper respiratory tract	<.001, -/-/+	<.001, +/-/-	.07	<.001, -/-/-
Pneumonia, organism unspecified	<.001, -/-/-	<.001, +/+/+	.07	<.001, -/-/-
Asthma	.00	<.001, +/+/+	<.001, -/+/+	<.001, -/-/-
Pneumonitis due to solids and liquids	<.001, -/-/-	<.001, +/-/-	.71	<.001, -/-/-
Other diseases of lung	<.001, -/+/+	<.001, +/-/+	.20	<.001, -/-/-
Diseases of hard tissues of teeth	.01	<.001, -/+/-	<.001, -/-/-	<.001, -/-/-
Diseases of esophagus	<.001, +/+/+	<.001, +/+/+	.51	<.001, -/-/-
Disorders of function of stomach	<.001, -/-/+	<.001, -/-/-	.48	<.001, -/-/-
Other and unspecified noninfectious gastroenteritis and colitis	<.001, -/-/+	<.001, +/-/-	.00	<.001, -/-/-
Functional digestive disorders, not elsewhere classified	<.001, -/+/+	<.001, +/+/+	.79	<.001, -/-/-
Contact dermatitis and other eczema	.00	<.001, -/-/-	<.001, -/-/-	<.001, -/-/-
Erythematous conditions	<.001, -/-/-	<.001, -/-/-	.04	<.001, -/-/-
Other and unspecified disorders of joint	<.001, -/-/+	<.001, -/-/+	.00	<.001, -/-/-
Other disorders of synovium, tendon, and bursa	<.001, -/+/+	<.001, -/-/-	.80	<.001, -/-/-
Other disorders of soft tissues	<.001, -/+/+	<.001, -/-/+	.00	<.001, -/-/-
Other disorders of bone and cartilage	<.001, -/-/+	<.001, +/-/-	.03	<.001, -/-/-
Other acquired deformities of limbs	<.001, -/+/+	<.001, +/-/-	.07	<.001, -/-/-

PheWAS	Subgroup 1	Subgroup 2	Subgroup 3	Subgroup 4
Curvature of spine	<.001, -/-/+	<.001, -/+/+	.82	<.001, -/-/-
Other congenital anomalies of nervous system	<.001, +/+/+	<.001, +/+/+	.71	<.001, -/-/-
Certain congenital musculoskeletal deformities	<.001, -/+/+	<.001, +/-/+	.83	<.001, -/-/-
Other and unspecified congenital anomalies	<.001, -/+/+	<.001, +/+/+	.16	<.001, -/-/-
Disorders relating to short gestation and unspecified low birth weight	<.001, +/-/-	<.001, +/-/-	.45	<.001, -/-/-
Fetal and neonatal hemorrhage	<.001, -/-/-	<.001, -/-/-	.41	<.001, -/-/-
Other and ill-defined conditions originating in the perinatal period	<.001, -/-/-	<.001, -/-/-	.65	<.001, -/-/-
Convulsions	<.001, +/+/+	<.001, +/+/+	.00	<.001, -/-/-
Symptoms involving nervous and musculoskeletal systems	<.001, +/+/+	<.001, +/-/-	.00	<.001, -/-/-
Symptoms involving skin and other integumentary tissue	<.001, -/-/-	<.001, +/-/+	.01	<.001, -/-/-
Symptoms concerning nutrition, metabolism, and development	<.001, +/+/+	<.001, +/+/+	.02	<.001, -/-/-
Symptoms involving respiratory system and other chest symptoms	<.001, -/+/+	<.001, +/+/+	.00	<.001, -/-/-
Symptoms involving digestive system	<.001, +/+/+	<.001, +/+/+	.03	<.001, -/-/-
Other symptoms involving abdomen and pelvis	<.001, -/-/+	<.001, +/+/+	.00	<.001, -/-/-
Nonspecific findings on examination of blood	<.001, -/-/-	<.001, -/-/-	.27	<.001, -/-/-
Nonspecific abnormal results of function studies	<.001, -/+/+	<.001, -/-/-	.02	<.001, -/-/-
Intestinal infections due to other organisms	.00	<.001, +/-/-	.04	<.001, -/-/-
Ill-defined intestinal infections	.08	<.001, -/-/-	.00	<.001, -/-/-

Full P Value Table Comparing Cases in Each Cluster to the Autistic Population, Continued

PheWAS name	Subgroup 1	Subgroup 2	Subgroup 3	Subgroup 4
Septicemia	.23	<.001, +/–/–	.92	<.001, –/–/–
Chickenpox	.15	<.001, –/–/–	.22	<.001, –/–/–
Other diseases due to viruses and chlamydia	.33	<.001, –/–/–	.00	<.001, –/–/–
Dermatophytosis	.09	<.001, –/–/–	.00	<.001, –/–/–
Candidiasis	.00	<.001, –/–/–	.56	<.001, –/–/–
Acquired hypothyroidism	.00	<.001, –/–/–	.01	<.001, –/–/–
Other disorders of pancreatic internal secretion	<.001, –/–/–	.04	.88	<.001, –/–/–
Other endocrine disorders	<.001, –/+/+	.03	.11	<.001, –/–/–
Other nutritional deficiencies	.03	<.001, –/–/–	.02	<.001, –/–/–
Overweight, obesity	.06	<.001, –/+/+	.00	<.001, –/–/–
Iron deficiency anemias	.01	<.001, –/–/–	.04	<.001, –/–/–
Other and unspecified anemias	.01	<.001, –/–/–	.21	<.001, –/–/–
Coagulation defects	.09	<.001, –/–/–	.48	<.001, –/–/–
Purpura and other hemorrhagic conditions	.06	<.001, –/–/–	.57	<.001, –/–/–
Other diseases of blood and blood-forming organs	.02	<.001, +/–/–	.00	<.001, –/–/–
Episodic mood disorders	.01	.00	<.001, –/+/+	<.001, –/–/–
Bipolar	.16	.80	<.001, –/+/+	<.001, –/–/–
Depression	.81	.01	<.001, –/+/+	<.001, –/–/–

PheWAS	Subgroup 1	Subgroup 2	Subgroup 3	Subgroup 4
Other nonorganic psychoses	.81	.54	<.001, –/–/+	<.001, –/–/–
Anxiety, dissociative and somatoform disorders	.55	.22	<.001, –/+/+	<.001, –/–/–
Disturbance of emotions specific to childhood and adolescence	.55	.00	<.001, –/+/+	<.001, –/–/–
Psychic factors associated with diseases classified elsewhere	.25	<.001, –/–/–	.02	<.001, –/–/–
Organic sleep disorders	.00	<.001, –/–/+	.56	<.001, –/–/–
Other extrapyramidal disease and abnormal movement disorders	<.001, –/+/+	.01	.15	<.001, –/–/–
Hemiplegia and hemiparesis	<.001, –/+/+	.13	.25	<.001, –/–/–
Disorders of the globe	<.001, –/–/–	.03	.77	<.001, –/–/–
Other retinal disorders	<.001, –/–/–	.00	.92	<.001, –/–/–
Keratitis	.12	<.001, –/–/–	.01	<.001, –/–/–
Corneal opacity and other disorders of cornea	.08	<.001, –/–/–	.09	<.001, –/–/–
Disorders of conjunctiva	.20	<.001, +/–/–	.01	<.001, –/–/–
Inflammation of eyelids	.54	<.001, –/–/–	.04	<.001, –/–/–
Disorders of lacrimal system	.09	<.001, –/–/–	.84	<.001, –/–/–
Disorders of optic nerve and visual pathways	<.001, –/–/+	.02	.12	<.001, –/–/–
Disorders of external ear	.05	<.001, +/+/+	.06	<.001, –/–/–
Otitis media and Eustachian tube disorders	.00	<.001, +/+/+	.00	<.001, –/–/–
Other disorders of tympanic membrane	.89	<.001, –/+/+	.38	<.001, –/–/–

Full P Value Table Comparing Cases in Each Cluster to the Autistic Population, Continued

PheWAS	Subgroup 1	Subgroup 2	Subgroup 3	Subgroup 4
Other disorders of ear	.01	<.001, -/-/-	.02	<.001, -/-/-
Hypertension	.04	<.001, -/-/+	.19	<.001, -/-/-
Cardiomyopathy	.15	<.001, +/-/-	.08	<.001, -/-/-
Heart failure	.48	<.001, +/-/-	.39	<.001, -/-/-
Ill-defined descriptions and complications of heart disease	.19	<.001, +/-/-	.12	<.001, -/-/-
Occlusion of cerebral arteries	<.001, -/-/-	.07	.41	<.001, -/-/-
Acute nasopharyngitis	.73	<.001, -/-/-	.01	<.001, -/-/-
Acute sinusitis	.17	<.001, -/-/-	.05	<.001, -/-/-
Acute bronchitis and bronchiolitis	.02	<.001, +/-/-	.06	<.001, -/-/-
Chronic pharyngitis and nasopharyngitis	.43	<.001, -/-/-	.16	<.001, -/-/-
Chronic disease of tonsils and adenoids	.10	<.001, +/-/-	.03	<.001, -/-/-
Viral pneumonia	.14	<.001, -/-/-	.11	<.001, -/-/-
Other bacterial pneumonia	.00	<.001, -/-/-	.80	<.001, -/-/-
Chronic airway obstruction, not elsewhere classified	.58	<.001, -/-/-	.63	<.001, -/-/-
Pleurisy	.19	<.001, -/-/-	.50	<.001, -/-/-
Other diseases of respiratory system	.07	<.001, +/-/-	.22	<.001, -/-/-
Disorders of tooth development and eruption	.20	<.001, -/-/-	.02	<.001, -/-/-
Gingival and periodontal diseases	.07	<.001, -/-/-	.00	<.001, -/-/-

PheWAS	Subgroup 1	Subgroup 2	Subgroup 3	Subgroup 4
Dentofacial anomalies, including malocclusion	.25	<.001, -/-/-	.02	<.001, -/-/-
Diseases of the oral soft tissues, excluding lesions specific for gingiva and tongue	.15	<.001, -/-/-	.45	<.001, -/-/-
Gastritis and duodenitis	.01	<.001, -/-/-	.18	<.001, -/-/-
Hernia of abdominopelvic cavity	.00	<.001, +/-/-	.18	<.001, -/-/-
Intestinal obstruction without mention of hernia	.00	<.001, -/-/-	.77	<.001, -/-/-
Other disorders of intestine	.00	<.001, -/-/-	.09	<.001, -/-/-
Gastrointestinal hemorrhage	.36	<.001, -/-/-	.26	<.001, -/-/-
Intestinal malabsorption	<.001, -/+/-	.15	.09	<.001, -/-/-
Chronic kidney disease	.61	<.001, -/-/+	.19	<.001, -/-/-
Hydronephrosis	.31	<.001, -/-/-	.76	<.001, -/-/-
Other disorders of kidney and ureter	.00	<.001, +/-/+	.46	<.001, -/-/-
Other disorders of urethra and urinary tract	.00	<.001, +/+/+	.10	<.001, -/-/-
Hydrocele	.28	<.001, -/-/-	.16	<.001, -/-/-
Redundant prepuce and phimosis	.04	<.001, -/-/-	.00	<.001, -/-/-
Disorders of penis	.39	<.001, -/-/-	.00	<.001, -/-/-
Inflammatory disease of cervix, vagina, and vulva	.02	<.001, -/-/-	.03	<.001, -/-/-
Disorders of menstruation and other abnormal bleeding from female genital tract	<.001, -/-/+	.16	.11	<.001, -/-/-
Superficial cellulitis and abscess	.00	<.001, +/-/-	.03	<.001, -/-/-

Full *P* Value Table Comparing Cases in Each Cluster to the Autistic Population, Continued

PheWAS	Subgroup 1	Subgroup 2	Subgroup 3	Subgroup 4
Impetigo	.12	<.001, -/-/-	.03	<.001, -/-/-
Other local infections of skin and subcutaneous tissue	.48	<.001, -/-/-	.32	<.001, -/-/-
Atopic dermatitis and related conditions	.02	<.001, -/+/-	.00	<.001, -/-/-
Other hypertrophic and atrophic conditions of skin	.09	<.001, -/-/-	.01	<.001, -/-/-
Other disorders of skin and subcutaneous tissue	.53	<.001, -/-/-	.00	<.001, -/-/-
Other derangement of joint	<.001, -/+/+	.00	.90	<.001, -/-/-
Other disorders of cervical region	.81	<.001, -/-/-	.20	<.001, -/-/-
Other and unspecified disorders of back	.08	<.001, -/-/-	.46	<.001, -/-/-
Disorders of muscle, ligament, and fascia	<.001, -/+/+	.00	.92	<.001, -/-/-
Osteoporosis	<.001, -/-/-	.09	.46	<.001, -/-/-
Congenital anomalies of eye	.07	<.001, +/+/+	.61	<.001, -/-/-
Congenital anomalies of ear, face, and neck	.00	<.001, -/+/-	.84	<.001, -/-/-
Bulbus cordis anomalies and anomalies of cardiac septal closure	.18	<.001, +/+/+	.80	<.001, -/-/-
Other congenital anomalies of heart	.09	<.001, +/+/+	.34	<.001, -/-/-
Other congenital anomalies of circulatory system	.24	<.001, +/+/+	.29	<.001, -/-/-
Anomalies of respiratory system, congenital	.00	<.001, +/-/-	.34	<.001, -/-/-
Other congenital anomalies of upper alimentary tract	.04	<.001, -/-/-	.62	<.001, -/-/-
Other congenital anomalies of digestive system	.13	<.001, +/+/-	.84	<.001, -/-/-

PheWAS	Subgroup 1	Subgroup 2	Subgroup 3	Subgroup 4
Congenital anomalies of genital organs	.05	<.001, +/-/-	.09	<.001, -/-/-
Congenital anomalies of urinary system	.39	<.001, +/+/+	.61	<.001, -/-/-
Other congenital anomalies of limbs	.00	<.001, +/+/+	.36	<.001, -/-/-
Other congenital musculoskeletal anomalies	.00	<.001, +/+/+	.09	<.001, -/-/-
Chromosomal anomalies	.00	<.001, +/+/+	.34	< 0.001, -/-/-
Other respiratory conditions of fetus and newborn	.01	<.001, +/-/-	.16	<.001, -/-/-
Hematologic disorders of newborn	.05	<.001, -/-/-	.83	<.001, -/-/-
Conditions involving the integument and temperature regulation of fetus and newborn	.32	<.001, -/-/-	.40	<.001, -/-/-
Symptoms involving cardiovascular system	.06	<.001, -/-/-	.02	<.001, -/-/-
Symptoms involving urinary system	.04	<.001, -/-/-	.00	<.001, -/-/-
Nonspecific findings on examination of urine	.22	<.001, -/-/-	.41	<.001, -/-/-
Other and nonspecific abnormal cytologic, histologic, immunologic and DNA test findings	<.001, -/-/-	.06	.01	<.001, -/-/-
Other bacterial diseases	.44	<.001, -/-/-	.29	.00
Other viral exanthemata	.65	.00	.00	<.001, -/-/-
Neoplasms of unspecified nature	<.001, -/-/-	.46	.30	.01
Other and unspecified disorders of metabolism	.00	.00	.41	<.001, -/-/-
Cystic fibrosis	.00	.08	.30	<.001, -/-/-
Schizophrenic disorders	.71	.79	<.001, -/-/-	.00

Full P Value Table Comparing Cases in Each Cluster to the Autistic Population, Continued

PheWAS	Subgroup 1	Subgroup 2	Subgroup 3	Subgroup 4
Eating disorders	.02	.00	.03	<.001, -/-/-
Acute reaction to stress	.02	.00	.01	<.001, -/-/-
Disorders of the autonomic nervous system	<.001, -/-/+	.09	.70	.00
Migraine	.01	.00	.08	<.001, -/-/-
Disorders of the orbit	.69	.00	.04	<.001, -/-/-
Other disorders of eye	.01	.00	.76	<.001, -/-/-
Other diseases of endocardium	.19	<.001, -/-/-	.79	.00
Intracerebral hemorrhage	.00	.02	.73	<.001, -/-/-
Other and unspecified intracranial hemorrhage	.03	.00	.18	<.001, -/-/-
Other peripheral vascular disease	.00	.00	.29	<.001, -/-/-
Allergic rhinitis	.08	.00	.00	<.001, -/-/-
Influenza	.29	.00	.09	<.001, -/-/-
Other diseases and conditions of the teeth and supporting structures	.22	.09	.00	<.001, -/-/-
Diseases of the salivary glands	.00	.00	.35	<.001, -/-/-
Other disorders of stomach and duodenum	.07	<.001, -/-/-	.72	.00
Vascular insufficiency of intestine	.54	<.001, -/-/-	.56	.00
Chronic liver disease and cirrhosis	.01	.00	.08	<.001, -/-/-
Renal failure NOS	.56	<.001, -/-/-	.60	.00

PheWAS	Subgroup 1	Subgroup 2	Subgroup 3	Subgroup 4
Dermatitis due to substances taken internally	.00	.00	.16	<.001, -/-/-
Psoriasis and similar disorders	.28	<.001, -/-/-	.46	.00
Diseases of sebaceous glands	.00	.01	.09	<.001, -/-/-
Urticaria	.31	<.001, -/-/-	.20	.00
Flat foot	.01	.00	.67	<.001, -/-/-
Spina bifida	.33	<.001, +/+/+	.61	.00
Fetus or newborn affected by maternal conditions which may be unrelated to present pregnancy	.11	<.001, -/-/-	.72	.00
Endocrine and metabolic disturbances specific to the fetus and newborn	.01	.00	.81	<.001, -/-/-
Urinary incontinence	.00	.00	.00	<.001, -/-/-
Other nonspecific abnormal findings	.05	.00	.03	<.001, -/-/-
Cholera	.51	.02	.52	.05
Typhoid and paratyphoid fevers	.50	.50	.50	.50
<i>Salmonella</i>	.52	.00	.54	.01
Shigellosis	.50	.50	.50	.50
Other food poisoning (bacterial)	.51	.52	.02	.06
Amebiasis	.51	.52	.52	.56
Other protozoal intestinal diseases	.54	.08	.56	.21
Intestinal <i>E coli</i>	.50	.50	.50	.50



Full P Value Table Comparing Cases in Each Cluster to the Autistic Population, Continued

PheWAS	Subgroup 1	Subgroup 2	Subgroup 3	Subgroup 4
Tuberculosis	.59	.16	.65	.45
Plague	.50	.50	.50	.50
Tularemia	.50	.50	.50	.50
Anthrax	.50	.50	.50	.50
Brucellosis	.50	.50	.50	.50
Glanders	.50	.50	.50	.50
Melioidosis	.50	.50	.50	.50
Rat-bite fever	.50	.50	.50	.50
Other zoonotic bacterial diseases	.51	.52	.52	.56
Leprosy	.50	.50	.50	.50
Diseases due to other mycobacteria	.54	.02	.56	.03
Diphtheria	.02	.04	.54	.01
Whooping cough	.58	.21	.01	.04
Erysipelas	.51	.02	.52	.05
Meningococcal infection	.50	.50	.50	.50
Tetanus	.51	.52	.52	.55
Actinomycotic infections	.51	.02	.52	.06
HIV disease	.52	.02	.54	.06

PheWAS	Subgroup 1	Subgroup 2	Subgroup 3	Subgroup 4
Acute poliomyelitis	0.50	.50	.50	.50
Slow virus infections and prion diseases of central nervous system	.50	.50	.50	.50
Meningitis due to enterovirus	.06	0.07	.60	.02
Other enterovirus diseases of central nervous system	.50	.50	.50	.50
Other nonarthropod-borne viral diseases of central nervous system	.55	.05	.58	.14
Smallpox	.50	.50	.50	.50
Cowpox and paravaccinia	.50	.50	.50	.50
Herpes zoster	.52	.54	.54	.60
Herpes simplex	.02	.09	.07	.02
Measles	.51	.02	.52	.06
Rubella	.50	.50	.50	.50
Other human herpes virus	.50	.50	.50	.50
Other poxvirus infections	.50	.50	.50	.50
Yellow fever	.50	.50	.50	.50
Dengue	.50	.50	.50	.50
Mosquito-borne viral encephalitis	.54	.56	.00	.02
Tick-borne viral encephalitis	.50	.50	.50	.50
Viral encephalitis transmitted by other and unspecified arthropods	.50	.50	.50	.50

Full *P* Value Table Comparing Cases in Each Cluster to the Autistic Population, Continued

PheWAS	Subgroup 1	Subgroup 2	Subgroup 3	Subgroup 4
Arthropod-borne hemorrhagic fever	.50	.50	.50	.50
Other arthropod-borne viral diseases	.50	.50	.50	.50
Viral hepatitis	.51	.52	.52	.55
Viral hepatitis A	.52	.54	.54	.60
Viral hepatitis B	.52	.54	.54	.60
Viral hepatitis C	.51	.02	.52	.05
Rabies	.52	.04	.54	.11
Mumps	.50	.50	.50	.50
Ornithosis	.50	.50	.50	.50
Specific diseases due to coxsackie virus	.54	.56	.07	.21
Infectious mononucleosis	.61	.03	.68	.09
Trachoma	.50	.50	.50	.50
Other diseases of conjunctiva due to viruses and chlamydia	.69	.00	.00	.00
Louse-borne (epidemic) typhus	.50	.50	.50	.50
Other typhus	.50	.50	.50	.50
Tick-borne rickettsioses	.50	.50	.50	.50
Other rickettsioses	.50	.50	.50	.50
Malaria	.51	.52	.52	.55

PheWAS	Subgroup 1	Subgroup 2	Subgroup 3	Subgroup 4
Leishmaniasis	.50	.50	.50	.50
Trypanosomiasis	.50	.50	.50	.50
Relapsing fever	.50	.50	.50	.50
Other arthropod-borne diseases	.55	.13	.03	.02
Congenital syphilis	.50	.50	.50	.50
Syphilis	.51	.52	.52	.56
Gonococcal infections	.50	.50	.50	.50
Other venereal diseases	.50	.50	.50	.50
Leptospirosis	.50	.50	.50	.50
Vincent angina	.50	.50	.50	.50
Yaws	.50	.50	.50	.50
Pinta	.50	.50	.50	.50
Other spirochetal infection	.50	.50	.50	.50
Dermatomycosis, other and unspecified	.50	.50	.50	.50
Coccidioidomycosis	.50	.50	.50	.50
Histoplasmosis	.50	.50	.50	.50
Blastomycotic infection	.51	.52	.52	.55
Other mycoses	.19	.79	.54	.62

Full P Value Table Comparing Cases in Each Cluster to the Autistic Population, Continued

PheWAS	Subgroup 1	Subgroup 2	Subgroup 3	Subgroup 4
Opportunistic mycoses	.50	.50	.50	.50
Schistosomiasis (bilharziasis)	.51	.02	.52	.05
Other trematode infections	.51	.52	.52	.55
Echinococcosis	.50	.50	.50	.50
Other cestode infection	.50	.50	.50	.50
Trichinosis	.50	.50	.50	.50
Filarial infection and dracontiasis	.50	.50	.50	.50
Ancylostomiasis and necatoriasis	.50	.50	.50	.50
Other intestinal helminthiases	.06	.06	.07	.00
Other and unspecified helminthiases	.51	.52	.52	.55
Intestinal parasitism, unspecified	.51	.52	.52	.55
Toxoplasmosis	.51	.52	.52	.56
Trichomoniasis	.50	.50	.50	.50
Pediculosis and phthirus infestation	.01	.52	.52	.05
Acariasis	.63	.01	.08	.00
Other infestation	.50	.50	.50	.50
Sarcoidosis	.50	.50	.50	.50
Other and unspecified infectious and parasitic diseases	.08	.01	.06	.00

PheWAS	Subgroup 1	Subgroup 2	Subgroup 3	Subgroup 4
Late effects of other infectious and parasitic diseases	.01	.06	.58	.02
Malignant neoplasm of lip	.51	.52	.02	.06
Malignant neoplasm of oral cavity	.50	.50	.50	.50
Malignant neoplasm of major salivary glands	.51	.52	.02	.05
Malignant neoplasm of esophagus	.50	.50	.50	.50
Malignant neoplasm of stomach	.50	.50	.50	.50
Malignant neoplasm of small intestine, including duodenum	.50	.50	.50	.50
Malignant neoplasm of colon	.50	.50	.50	.50
Malignant neoplasm of rectum, rectosigmoid junction, and anus	.50	.50	.50	.50
Malignant neoplasm of liver and intrahepatic bile ducts	.50	.50	.50	.50
Malignant neoplasm of gallbladder and extrahepatic bile ducts	.50	.50	.50	.50
Malignant neoplasm of pancreas	.50	.50	.50	.50
Malignant neoplasm of retroperitoneum and peritoneum	.51	.52	.52	.55
Malignant neoplasm of other and ill-defined sites within the digestive organs and peritoneum	.50	.50	.50	.50
Malignant neoplasm of nasal cavities, middle ear, and accessory sinuses	.51	.02	.52	.06
Malignant neoplasm of larynx	.50	.50	.50	.50
Malignant neoplasm of trachea, bronchus, and lung	.51	.52	.52	.55
Malignant neoplasm of pleura	.50	.50	.50	.50

Full P Value Table Comparing Cases in Each Cluster to the Autistic Population, Continued

PheWAS	Subgroup 1	Subgroup 2	Subgroup 3	Subgroup N4
Malignant neoplasm of thymus, heart, and mediastinum	.50	.50	.50	.50
Malignant neoplasm of other and ill-defined sites within the respiratory system and intrathoracic organs	.50	.50	.50	.50
Malignant neoplasm of bone and articular cartilage	.52	.02	.54	.06
Malignant neoplasm of connective and other soft tissue	.02	.54	.54	.11
Malignant melanoma of skin	.51	.02	.52	.05
Other malignant neoplasm of skin	.04	.02	.54	.01
Malignant neoplasm of female breast	.50	.50	.50	.50
Malignant neoplasm of male breast	.50	.50	.50	.50
Kaposi sarcoma	.50	.50	.50	.50
Malignant neoplasm of uterus	.50	.50	.50	.50
Malignant neoplasm of cervix uteri	.50	.50	.50	.50
Malignant neoplasm of placenta	.50	.50	.50	.50
Malignant neoplasm of ovary and other uterine adnexa	.53	.54	.54	.61
Malignant neoplasm of other and unspecified female genital organs	.50	.50	.50	.50
Malignant neoplasm of prostate	.50	.50	.50	.50
Malignant neoplasm of testis	.51	.02	.52	.06
Malignant neoplasm of penis and other male genital organs	.50	.50	.50	.50
Malignant neoplasm of bladder	0.50	.50	.50	.50

PheWAS	Subgroup 1	Subgroup 2	Subgroup 3	Subgroup 4
Malignant neoplasm of kidney and other and unspecified urinary organs	.53	.00	.56	.02
Malignant neoplasm of eye	.54	.56	.56	.65
Malignant neoplasm of brain	.00	.05	.47	.00
Malignant neoplasm of other and unspecified parts of nervous system	.08	.17	.07	.11
Malignant neoplasm of thyroid gland	.50	.50	.50	.50
Malignant neoplasm of other endocrine glands and related structures	.56	.02	.60	.07
Malignant neoplasm of other and ill-defined sites	.00	.00	.60	.00
Secondary and unspecified malignant neoplasm of lymph nodes	.50	.50	.50	.50
Secondary malignant neoplasm of respiratory and digestive systems	.50	.50	.50	.50
Secondary malignant neoplasm of other specified sites	.50	.50	.50	.50
Lymphosarcoma and reticulosarcoma and other specified malignant tumors of lymphatic tissue	.04	.54	.54	.16
Hodgkin disease	.52	.00	.55	.01
Other malignant neoplasms of lymphoid and histiocytic tissue	.54	.02	.56	.12
Multiple myeloma and immunoproliferative neoplasms	.50	.50	.50	.50
Lymphoid leukemia	.02	.13	.69	.05
Myeloid leukemia	.52	.02	.54	.06
Monocytic leukemia	.50	.50	.50	.50
Other specified leukemia	.53	.54	.54	.61

Full *P* Value Table Comparing Cases in Each Cluster to the Autistic Population, Continued

PheWAS	Subgroup 1	Subgroup 2	Subgroup 3	Subgroup 4
Leukemia of unspecified cell type	.11	.00	.62	.01
Neuroendocrine tumors	.50	.50	.50	.50
Benign neoplasm of lip, oral cavity, and pharynx	.55	.58	.58	.69
Benign neoplasm of other parts of digestive system	.03	.63	.03	.02
Benign neoplasm of respiratory and intrathoracic organs	.52	.54	.54	.60
Benign neoplasm of bone and articular cartilage	.67	.32	.76	.68
Lipoma	.61	.67	.68	.84
Other benign neoplasm of connective and other soft tissue	.15	.27	.65	.45
Benign neoplasm of skin	.55	.00	.10	.00
Benign neoplasm of breast	.50	.50	.50	.50
Uterine leiomyoma	.51	.02	.52	.05
Other benign neoplasm of uterus	.51	.52	.52	.55
Benign neoplasm of ovary	.50	.50	.50	.50
Benign neoplasm of other female genital organs	.51	.52	.02	.05
Benign neoplasm of male genital organs	.52	.54	.54	.60
Benign neoplasm of kidney and other urinary organs	.51	.52	.52	.55
Benign neoplasm of eye	.14	.64	.14	.24
Benign neoplasm of brain and other parts of nervous system	.05	.13	.25	.04

PheWAS	Subgroup 1	Subgroup 2	Subgroup 3	Subgroup 4
Benign neoplasm of thyroid glands	.50	.50	.50	.50
Benign neoplasm of other endocrine glands and related structures	.52	.54	.54	.60
Hemangioma and lymphangioma, any site	.35	.24	.12	.12
Benign neoplasm of other and unspecified sites	.55	.58	.58	.68
Carcinoma in situ of digestive organs	.50	.50	.50	.50
Carcinoma in situ of respiratory system	.50	.50	.50	.50
Carcinoma in situ of skin	.50	.50	.50	.50
Carcinoma in situ of breast and genitourinary system	.50	.50	.50	.50
Carcinoma in situ of other and unspecified sites	.50	.50	.50	.50
Neoplasm of uncertain behavior of digestive and respiratory systems	.01	.52	.52	.05
Neoplasm of uncertain behavior of genitourinary organs	.51	.02	.52	.05
Neoplasm of uncertain behavior of endocrine glands and nervous system	.24	.82	.04	.19
Neoplasm of uncertain behavior of other and unspecified sites and tissues	.03	.39	.72	.20
Simple and unspecified goiter	.08	.61	.62	.34
Nontoxic nodular goiter	.58	.21	.05	.12
Thyrotoxicosis with or without goiter	.03	.64	.65	.18
Congenital hypothyroidism	.03	.10	.13	.11
Thyroiditis	.63	.01	.06	.00